

What is claimed:

1. A method for protecting a span in a communication network, the span connecting a first node to a second node, the method comprising:
creating a first protection virtual path connecting the first node with the second node through at least a third node using a routing-protocol and a signaling- protocol;
monitoring a failure condition in the span; and
upon detecting the failure condition in the span,
switching automatically to the first protection virtual path, and
creating a new protection virtual path, using the routing-protocol and the signaling- protocol, for each span in the first protection virtual path, connecting two nodes at each end of the given span through at least another node.

2. A method for protecting a span in a communication network, the span connecting a first node to a second node and including a working line and a protection line, the method comprising:
creating a protection virtual path connecting the first node with the second node through at least a third node using a routing-protocol and a signaling- protocol;
monitoring a failure condition in the working line;
switching automatically to the protection line upon detecting the failure condition in the working line;
monitoring a failure condition in the protection line;
switching automatically to the protection virtual path upon detecting the failure condition in both the working line and the protection line.

3. The method of claim 2 wherein each span in the protection virtual path having a working line and a protection line, the method further comprising:
monitoring a failure condition in the working line in each given span in the protection virtual path; and
switching automatically to a corresponding protection line in the given span upon detecting the failure condition in the working line in the given span.

4. The method of claim 2 further comprising:

creating a new protection virtual path, using the routing-protocol and the signaling-protocol, for given span in the first protection virtual path, each span connecting two nodes at each end of the given span through at least another node.

5. A node connecting to another node with a direct path in a communication network, the node comprising:

a path type indicator having a value of either a working type or a protecting type, adapted to specify a type of the direct path;

electronic path-specifying circuitry adapted to specify a protection virtual path;

electronic path-creating circuitry adapted to create a protection virtual path connecting the two nodes through a third node when the path type indicator being the working type; and

an automatic protection switch adapted to automatically switch traffic to the protection virtual path upon detecting a failure condition in the direct path.

6. The node of claim 5 wherein the electronic path-specifying circuitry includes: a designated transit list adapted to specify the protection virtual path.

7. The node of claim 5 wherein electronic path-creating circuitry comprises:

electronic circuitry adapted to support a routing-protocol; and

electronic circuitry adapted to support a signaling- protocol.

8. A protected path in a communication network connecting a first and a second node, the path comprising:

a first path connecting the first node with the second node;

path-specifying circuitry in one of the first and second nodes;

a pre-computed protection virtual path, specified by the path-specifying circuitry, connecting the first node with the second node through at least another node;

an automatic protection switch adapted to automatically switch traffic to the pre-computed protection virtual path upon detecting a failure condition in the first path.

9. The path of claim 8 wherein

the path-specifying circuitry includes a designated transit list adapted to specify the pre-computed protection virtual path.

10. The path of claim 8 further comprising electronic path-creating circuitry adapted to create one or more additional protection virtual paths upon detecting a failure condition in the first path, each additional protection virtual path connecting two adjacent nodes in the pre-computed protection virtual path.

11. The path of claim 8 wherein

the first path includes a plurality of spans.

12. The path of claim 8 wherein

the first path is a single span.

13. The path of claim 12 wherein the single span comprises a working line and a protection line.

14. The path of claim 13 including a linear automatic protection switch adapted to switch from the working line to the protection line upon detecting a failure condition on the working line.

15. The path of claim 14 wherein the linear automatic protection switch being part of the automatic protection switch in the first node.

16. The path of claim 13 wherein a span in the pre-computed protection virtual path comprises a working line and a protection line.

17. The path of claim 12 wherein
the single span comprises at least a second working line, the second working line being associated with another pre-computed protection virtual path, specified by the path-specifying circuitry, connecting the first node with the second node through at least another node.

18. A protected span in a communication network comprising:
a first node;
a second node;
a span connecting the first node with the second node, wherein the span comprises a working line and a protection line, and wherein the first node or the second node having an automatic protection switch adapted to switch from the working line to the protection line upon detecting a failure condition on the working line;
electronic path-specifying circuitry in one of the first and second nodes;
a pre-computed protection virtual path, specified by the electronic path-specifying circuitry, connecting the first node with the second node through at least a third node;
an automatic protection switch in the first node adapted to automatically switch to the pre-computed protection virtual path upon detecting failure condition in the span; and
wherein a given span in the pre-computed protection virtual path includes an additional working line and an additional protection line, and a linear automatic protection switch adapted to switch from the additional working line to the additional protection line upon detecting a failure condition of the additional working line.

19. A smart span in a communication network comprising:
a first node;
a second node;

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a span connecting the first node with the second node with a direct path;
a path type indicator, stored in one of the two nodes, having a value of either a working type or a protecting type adapted to specify a type of the direct path;
electronic path-creating circuitry in one of the first and second nodes; and
when the path type indicator being the working type,
a protection virtual path connecting the first and second nodes through a third node, created by the electronic path-creating circuitry, and
an automatic protection switch in one of the first and second nodes adapted to automatically switch to the protection virtual path upon detecting a failure condition in the span.

20. The smart span of claim 19 wherein the protection virtual path comprises an additional smart span including:

an additional direct path connecting two adjacent in the protection virtual path;
an additional path type indicator for the additional direct path adapted to change the value from the protecting type to the working type upon detecting a failure condition in the span connecting the first node with the second node; and

additional electronic path-creating circuitry in one of the two adjacent nodes adapted to create an additional protection virtual path connecting the two adjacent nodes through at least another node upon detecting a failure condition in the span connecting the first node with the second node.

21. The smart span of claim 19 wherein one of the first node and the second node includes

a designated transit list adapted to specify the protection virtual path.

22. The smart span of claim 19 wherein the electronic path-creating circuitry further comprises:

electronic circuitry adapted to support a routing-protocol; and
electronic circuitry adapted to support a signaling- protocol.

23. The smart span of claim 19 wherein the span connecting the first node with the second node further includes a protection line, the direct path in the span being a working line.

24. The smart span of claim 23 wherein one of the first node and the second node includes an automatic protection switch adapted to switch from the working line to the protection line upon detecting a failure condition on the working line.

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